

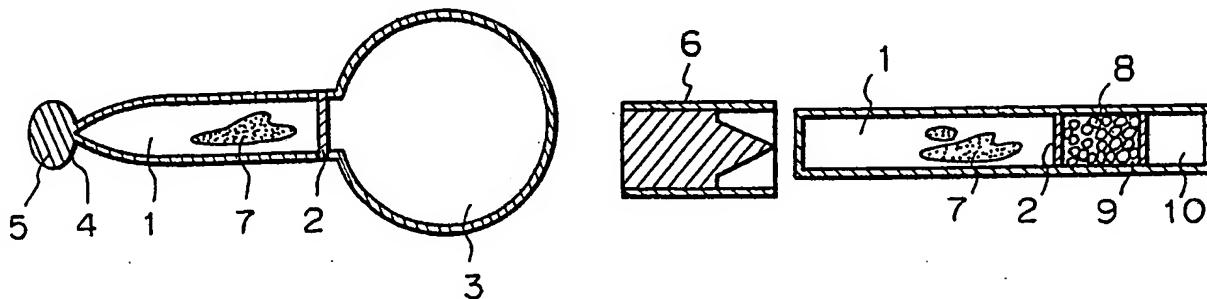


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(54) Title: POWDERY MEDICINE APPLICATOR DEVICE



(57) Abstract

A powdery medicine applicator device comprising a medicine-holding portion (1) having a powdery medicine (7) sealed therein, which has an opening formed at the head thereof to spray or inhale the powdery medicine (7), an air-introducing means (3, 10), and, if desired, a desiccant holding portion (9). The end of the applicator may be opened either by breaking off a knob (5) formed thereon or by perforation using a cap having a projection (6). The powdery medicine (7) is separated from the air-introducing means (3, 10) by an air-permeable partition wall (2).

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DESCRIPTION

TITLE OF THE INVENTION

Powdery Medicine Applicator Device

TECHNICAL FIELD

The present invention relates to a powdery medicine applicator device. More particularly, the present invention relates to a powdery medicine applicator device for holding a powdery medicine contained therein and spraying or inhaling the powdery medicine in a nasal cavity or other affected part, which is handy to carry and can be easily operated at the time of application of the powdery medicine. Moreover, the present invention relates to a powdery medicine applicator device in which a desiccant is sealingly included so that a powdery medicine contained therein is stabilized.

15 BACKGROUND ART

For patients suffering from a nose allergy, asthma, flat herpes, wide-range inflammatory stomatitis or a like disease, a curative method has been adopted in which a powdery medicine is applied into the nasal cavity or oral cavity.

In this curative method, a capsule filled with a powdery medicine is used as the powdery medicine applicator, and a device is known comprising an element for forming at least two holes in this powdery medicine-filled capsule and an element for feeding an air current in the perforated capsule to cause the powdery medicine to float in the air current.

For example, Japanese Unexamined Patent Publication (Kokai) No. 59-34267 discloses a device comprising (1) means for introducing an air current into a capsule for inhalation by a patient, (2) a housing for guiding a powdery medicine contained in the capsule into the nose or oral cavity of the patient, (3) a cap for the housing, and (4) a needle for perforating the capsule, which is attached to the interior of the cap so that the

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length of the needle is shorter than the length of the cap.

Although the size of this device is sufficiently compact, the device causes inconvenience to a user
5 because the device must be always carried together with powdery medicine-filled capsules.

Moreover, for an aged or juvenile patient, the operation of attaching a capsule to the device, and the subsequent operations for completion of spraying, are
10 complicated and cumbersome, and the user is likely to forget to return the parts of the device to the original positions.

Another problem of the conventional technique is that, since a pressing element such as a rubber ball is
15 used in the conventional device, a reduction of the size is restricted. Moreover, if a desiccant is placed in a capsule for preventing a powdery medicine contained in the capsule from being destabilized by an absorption of moisture, water in the capsule is migrated in the
20 desiccant, and a problem such as cracking occurs when the capsule is perforated by a needle with the result that an appropriate perforation cannot be obtained.

DISCLOSURE OF THE INVENTION

Accordingly, an object of the present invention is
25 to solve the above-mentioned problems of the conventional powdery medicine applicator device concerning the handiness when carried, ease of operation, and expedition of the application, and to provide a device which contains a powdery medicine in an amount corresponding
30 to one dose or several doses, and which can apply the powdery medicine to the nasal cavity or other affected part by a feeding or suction of air only by forming a powdery medicine-spraying hole or this spraying hole and an air-introducing hole at the time of application, and
35 which can be discarded after application or can be used again.

Another object of the present invention is to

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provide a powdery medicine applicator device which contains a powdery medicine in an amount corresponding to one dose or several doses, which can apply the powdery medicine to the nasal cavity or other affected part only by forming a powdery medicine-spraying hole at the time of application, and can be discarded after application or can be used again, and in which a capsule is easily perforated without trouble even if a desiccant is included for stabilizing the powdery medicine.

In accordance with the present invention, there is provided a powdery medicine applicator device comprising a medicine-holding portion having a powdery medicine sealed therein, which is constructed so that an opening is formed at the head thereof to spray or inhale the powdery medicine, and an air-introducing means, and the bottom of the medicine-holding portion is connected to the air-introducing means through a powdery medicine-impermeable and air permeable partition wall.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1 to 7 show devices each having a powdery medicine impermeable and air permeable wall at least at the bottom of a medicine-holding portion, wherein:

Figure 1 is a sectional view showing a device in which an opening for spraying a powdery medicine is formed by wrenching off a knob connected to the head of a medicine-holding portion;

Fig. 2 is a sectional view showing a device and a cap, in which an opening is formed by putting the cap having a projection at the center on the inner side on the head of a medicine-holding portion;

Fig. 3 is a sectional view illustrating a device in which a powdery medicine-spraying opening is formed by wrenching off a knob connected to the head of a medicine-holding portion;

Fig. 4 is a sectional view showing a device and a cap, in which an opening is formed by putting the cap having a projection at the center on the inner side

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on the head of a medicine-holding portion;

Figs. 3 and 4 show a desiccant held between partition walls or between a partition wall and a net;

Fig. 5 is a sectional view showing a device in
5 which an opening is formed in the same manner as in the device shown in Fig. 1, and a desiccant is fixed on the inner circumference of an air reservoir (desiccant-holding portion);

Fig. 6 is a sectional view illustrating a device in
10 which a powdery medicine-inhaling opening is formed by wrenching off a knob connected to the head of a medicine-holding portion and an air-introducing opening is formed by wrenching off a knob connected to the bottom of an air-introducing portion; and

15 Fig. 7 is a sectional view illustrating a device and a cap, in which an opening is formed by putting the cap having a projection at the center on the inner side on the head of a medicine-holding portion and the bottom of an air-introducing portion, and a desiccant is
20 contained in the air-introducing portion.

BEST MODE FOR CARRYING OUT THE INVENTION

In accordance with the first embodiment of the present invention, the air-introducing means of the powdery medicine applicator device is an air reservoir
25 formed of a flexible material, and the bottom of the medicine-holding portion is connected to the air reservoir through a powdery medicine-impermeable and air-permeable partition wall.

In accordance with the second embodiment of the
30 present invention, the air-introducing means of the powdery medicine applicator device is an air reservoir formed of a flexible material, and the powdery medicine applicator device comprises the above-mentioned medicine-holding portion, this device further comprises a
35 desiccant-holding portion, and the bottom of the medicine-holding portion is connected to the air reservoir through a powdery medicine-impermeable and air-permeable

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partition wall and the desiccant-holding portion, or this device contains a desiccant in the air reservoir.

In accordance with the third embodiment of the present invention, the air-introducing means of the 5 powdery medicine applicator device is an air-introducing portion having an air-introducing hole formed on the bottom thereof, and the bottom of the medicine-holding portion is connected to the air-introducing portion through a powdery medicine-impermeable and air-permeable 10 partition wall.

In accordance with the fourth embodiment of the present invention, the air-introducing means of the 15 powdery medicine applicator device is an air-introducing portion having an air-introducing hole formed on the bottom thereof and further having a desiccant-holding portion, and the bottom of the medicine-holding portion is connected to the air-introducing portion through a powdery medicine-impermeable and air-permeable partition 20 wall and the desiccant-holding portion, or a desiccant is contained in the air-introducing portion.

In the powdery medicine applicator device of the present invention, a powdery medicine is sealed in the interior of the medicine-holding portion, and before application, the medicine-holding portion is kept in the 25 sealed state. The shape of the medicine-holding portion is not particularly critical, so far as the shape is adaptable to the nasal cavity or other affected part to which the powdery medicine is applied and spraying or inhalation of the sealed powdery medicine is not inhibited by the medicine-holding portion. For example, a 30 cylindrical shape can be used.

Note, 5 to 500 mg of the powdery medicine is mechanically filled in the medicine-holding portion in advance.

35 In the device of the present invention, the medicine-holding portion is constructed so that an opening for spraying or inhaling the powdery medicine will be

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formed at the head of the medicine-holding portion. As the means for forming this opening, there can be mentioned, for example, a method in which a knob having a slender neck connected to the medicine-holding portion 5 is wrenched off to expose a small-diameter open end leading to the head of the medicine-holding portion, whereby an opening is formed, and a method in which a cap having a projection at the center on the inner side is put on the head of the medicine-holding portion to 10 form an opening.

Preferably, the thickness of the head of the medicine-holding portion is small, as the hole can be then formed easily and simply.

In general, this medicine-holding portion is 15 preferably composed of a polymer such as polyethylene, polystyrene, polypropylene, a styrene/acrylonitrile copolymer or an acrylonitrile/butadiene/styrene copolymer.

The size of the medicine-holding portion is appropriately determined according to the medicine-applying 20 portion, such as nasal cavity, the oral cavity, the pharynx, the lung or other affected part.

In the first and second embodiments of the present invention, the air reservoir is an element for compressing air necessary for spraying the powdery medicine 25 and is composed of a flexible material, for example, an elastic plastic material such as polyethylene or polypropylene, or a natural or synthetic rubber.

The medicine-holding portion can be composed of the 30 same material as that of the air reservoir.

Preferably, the size of the air reservoir is such that, by depressing or pressing the air reservoir 1 to 10 times, air is discharged in an amount sufficient 35 to discharge substantially all of the powdery medicine sealed in the medicine-holding portion. At the time of application, air introduced into the air reservoir is limited to that coming from the opening formed at the

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head of the medicine-holding portion.

In the present invention, the bottom of the medicine-holding portion is connected to the air reservoir through a powdery medicine-impermeable and air-permeable
5 partition wall (further, through a desiccant-holding portion in the second embodiment).

A sieving net having a mesh size of 5 to 37 μm , preferably 5 to 10 μm , or a membrane filter having a pore size of 5 to 75 μm , preferably 5 to 25 μm , is used
10 as the partition wall in the present invention.

For example, a sieving net formed of nylon or stainless steel or a membrane filter formed of polypropylene, cotton, rayon or glass fiber can be used. Of course, the constituting material is not limited to
15 those mentioned above, so long as the mesh size or pore size is within the above-mentioned range.

In the first and second embodiments of the present invention, it is generally considered that, when air is caused to flow into the air reservoir from the medicine-holding portion after formation of the opening, the powdery medicine sealed in the medicine-holding portion may flow backward through the sieving net or membrane filter, but where at least about 90% by weight of particles of the powdery medicine have an effective
20 particle size of about 20 to about 200 microns, a backward flow of the powdery medicine will not occur.
25

In the second embodiment of the present invention, preferably the desiccant in the desiccant-holding portion is held or fixed to the desiccant-holding
30 portion by some means. For example, the air reservoir side of the desiccant-holding portion may be constructed by a powdery medicine-impermeable and air-permeable partition wall or a net having a mesh size such that it will not allow the desiccant to fall into the air
35 reservoir. Furthermore, a ring-shaped desiccant may be fixed to the inner wall of the desiccant-holding portion.

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As the partition wall or net constructing the air reservoir side of the desiccant-holding portion in the present invention, there can be used a sieving net having a mesh size of 5 μm to 1 mm, preferably 5 to 5 200 μm , and a membrane filter having a pore size of 5 to 75 μm , preferably 5 to 25 μm .

A sieving net formed of nylon or stainless steel or a membrane filter composed of polypropylene, cotton, rayon or glass fiber can be used, but the constituting 10 material is not particularly critical, so long as the mesh size or pore size is within the above-mentioned range.

As the desiccant to be used in the present invention, there can be mentioned plate-shaped or granular 15 silica gel or calcium chloride, but the kind of the desiccant is not particularly critical, so long as the safety is high and the drying capacity is satisfactory.

In the present invention, the effect of the stabilizing the powdery medicine of the present invention can 20 be enhanced by using an oxygen absorber in addition to the desiccant.

In the third embodiment of the present invention, the air-introducing portion is constructed so that an air-introducing opening is formed on the bottom of the 25 air-introducing portion. As the means for forming this opening, a method can be adopted in which a knob having a slender neck connected to the bottom of the air-introducing portion is wrenched off to expose a small-diameter open end connected to the rear end of the 30 air-introducing portion, whereby an opening is formed, and a method in which a cap having a projection at the center on the inner side is put on the bottom of the air-introducing portion to form an opening.

In the fourth embodiment of the present invention, 35 a desiccant can be held in a desiccant-holding portion or the air-introducing portion in the same manner as described above. By thus holding the desiccant, even if

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there is a risk of degradation of the stability of the powdery medicine by an absorption of moisture, the stability of the medicine can be maintained at a high level. Furthermore, by holding an oxygen absorber in
5 addition to the desiccant, the effect of stabilizing the medicine can be further enhanced.

The powdery medicine applicator device according to the third embodiment of the present invention is advantageous in that, since the medicine is contained in the
10 device per se and a pressing element such as a rubber ball is not used, the size can be reduced and thus the handiness improved.

The powdery medicine applicator device of the present invention is characterized, first in that, since
15 the powdery medicine is contained in the device per se, the device is easy to carry. In the second place, the device of the present invention is characterized in that, by containing the powdery medicine in an amount corresponding to one or several doses, the applicator
20 can be discarded after application or can be used again. The device of the present invention is further characterized in that the number of constituent elements is very small and the device can be fabricated at a very low cost..

25 According to the second embodiment of the present invention, since the device is designed so that a desiccant can be held in the device, the risk of reduction of the stability of the powdery medicine sealed in the medicine-holding portion by an absorption of moisture can be eliminated and the stability of the powdery medicine can be maintained at a high level.

EXAMPLES

35 The present invention will now be described in detail with reference to the examples illustrated in the accompanying drawings, which by no means limit the scope of the invention.

Example 1

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Figure 1 illustrates the state where a powdery medicine 7 is filled in a medicine-holding portion 1 having a capacity capable of containing a powdery medicine therein. At the time of application, a knob 5 formed on the head end of the medicine-holding portion is wrenched off to expose a small-diameter open end 4 and form an opening. Then, by depressing or pressing air reservoir 3, air in the air reservoir 3 is caused to flow into the medicine-holding portion from the air reservoir through a partition wall 2 and the powdery medicine sealed in the medicine-holding portion is sprayed to the affected part. Air necessary for spraying at the subsequent application is introduced into the air reservoir by a backward flow from the opening at the head of the medicine-holding portion. At this point, a backward flow of the unsprayed powdery medicine is prevented by the partition wall, and thus is not introduced into the air reservoir. Therefore, loss of the powdery medicine can be prevented and substantially all of the powdery medicine can be sprayed to the affected part.

Figure 2 illustrates an embodiment in which a cap 6 having a projection at the center on the inner side is used for formation of an opening at the head of the medicine-holding portion 1, and an opening is formed by putting this cap on the head of the medicine-holding portion 1.

The subsequent operations are the same as in the embodiment shown in Fig. 1.

In this embodiment, if the powdery medicine is not completely sprayed but a part of the medicine is left, by sealing the device with the cap and storing the device in this state, the device can be used again.

Example 2

Figure 3 illustrates the state where a powdery medicine 7 is filled in a medicine-holding portion 1 having a capacity capable of containing a powdery

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medicine therein, and shows a desiccant held between partition walls. At the time of application, a knob 5 formed on the top end of the medicine-holding portion is wrenched off to expose a small-diameter open end and 5 form an opening. Then, by depressing or pressing an air-pressing air reservoir 3, air in the air reservoir is caused to flow into the medicine-holding portion from the air reservoir through a desiccant-holding portion 9 and a partition wall 2, and the powdery medicine sealed 10 in the medicine-holding portion is sprayed on the affected part. Air necessary for spraying at the subsequent spraying is introduced into the air reservoir by a backward flow from the opening of the medicine-holding portion. At this point, a backward flow of the 15 unsprayed powdery medicine is prevented by the partition wall, and thus is not introduced into the desiccant-holding portion or the air reservoir. Therefore, loss of the powdery medicine can be prevented and substantially all of the powdery medicine can be sprayed to the 20 affected part.

Figure 4 illustrates an embodiment in which a cap 6 having a projection at the center on the inner side is used for forming an opening at the head of the medicine-holding portion 1, and an opening is formed by putting 25 this cap on the head of the medicine-holding portion 1. Other operations are the same as in the embodiment shown in Fig. 3.

In this embodiment, if the powdery medicine is not completely sprayed but a part of the medicine is left, 30 by sealing the device with the cap and storing the device in this state, the device can be used again.

Figure 5 illustrates an embodiment in which a desiccant is fixed in the annular form along the inner circumference of the air reservoir. In this embodiment, 35 the air reservoir also acts as a desiccant-holding portion.

Example 3

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Figure 6 illustrates the state where a powdery medicine 7 is filled in a medicine-holding portion 1 having a capacity capable of containing a powdery medicine therein. At the time of application, a knob 5 formed on the head of the medicine-holding portion 1 is wrenched off to expose a small-diameter open end 4 and form an opening, and another knob 5 formed on the bottom of an air-introducing portion 10 is wrenched off to form an air-introducing opening. Then, the small-diameter open end at the head of the medicine-holding portion 1 is fitted to the nasal cavity or oral cavity, and by the inhaling operation of the breathing movement, the powdery medicine sealed in the medicine-holding portion is inhaled in the affected part. At the subsequent inhalation, the powdery medicine is inhaled, and even if the small-diameter open end remains fitted to the nasal cavity or oral cavity, the uninhaled powdery medicine is not introduced in the air-introducing portion 10 from the bottom of the medicine-holding portion 1 by the air breathed out from the nasal cavity or oral cavity. Therefore, any loss of the powdery medicine can be prevented and substantially all of the powdery medicine can be inhaled.

Figures 7 and 8 illustrates an embodiment in which a cap 6 having a projection at the center on the inner side is used for forming an opening on the head of the medicine-holding portion 1 and the bottom of the air-introducing portion 10, and an opening is formed by putting this cap on the head of the medicine-holding portion 1 or the bottom of the air-introducing portion 10. A desiccant 8 may be contained in a desiccant-holding portion 9 (Fig. 7) or in the air-introducing portion 10 (Fig. 8). The subsequent operations are the same as in the embodiment shown in Fig. 6.

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CLAIMS

1. A powdery medicine applicator device comprising a medicine-holding portion having a powdery medicine sealed therein, which is constructed so that an opening is formed at the head thereof to spray or inhale
5 the powdery medicine, an air-introducing means, and the bottom of the medicine-holding portion is connected to the air-introducing means through a powdery medicine-impermeable and air-permeable partition wall.
2. A powdery medicine applicator device as
10 claimed in claim 1, wherein the air-introducing means comprises an air reservoir composed of a flexible material.
3. A powdery medicine applicator device as
claimed in claim 2, wherein the opening for spraying the
15 powdery medicine is formed by wrenching off a knob connected to the head of the medicine-holding portion.
4. A powdery medicine applicator device as
claimed in claim 2, wherein the opening for spraying the powdery medicine is formed by putting a cap having a
20 projection at the center on the inner side on the head of the medicine-holding portion.
5. A powdery medicine applicator device as
claimed in claim 2, which further comprises a desiccant-holding portion, wherein the bottom of the medicine-holding portion is connected to the air reservoir
25 through a powdery medicine-impermeable and air-permeable partition wall and the desiccant-holding portion, or wherein a desiccant is contained in the air reservoir.
6. A powdery medicine applicator device as
30 claimed in claim 1, wherein the air-introducing means is an air-introducing portion constructed so that an air-introducing opening is formed at the bottom.
7. A powdery medicine applicator device as
claimed in claim 6, wherein the opening for inhaling the
35 powdering medicine and the air-introducing opening are formed by wrenching off knobs formed on the head of the

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medicine-holding portion and the bottom of the air-introducing portion, respectively.

8. A powdery medicine applicator device as claimed in claim 6, wherein the opening for inhaling the 5 powdery medicine and the air-introducing opening are formed by putting a cap having a projection at the center on the inner side on the head of the medicine-holding portion and the bottom of the air-introducing portion, respectively.

10. 9. A powdery medicine applicator device as claimed in claim 6, which further comprises a desiccant-holding portion, wherein the bottom of the medicine-holding portion is connected to the air reservoir through a powdery medicine-impermeable and air-permeable 15 partition wall and the desiccant-holding portion, or wherein a desiccant is contained in the air-introducing portion.

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Fig. 1

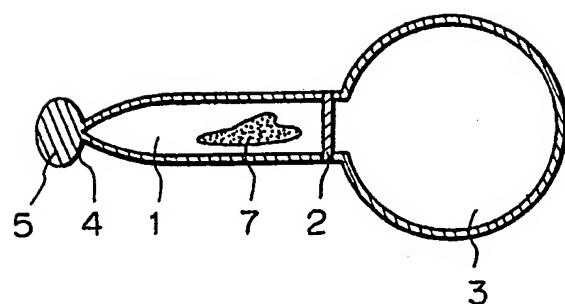


Fig. 2

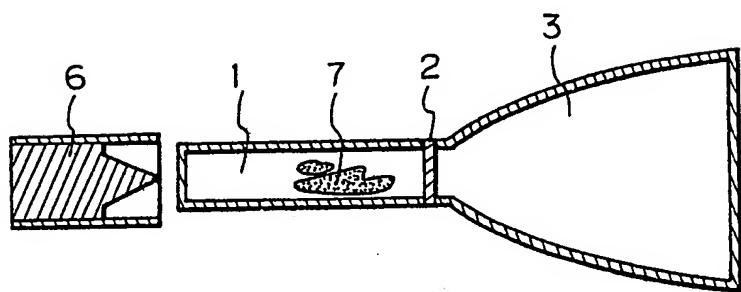
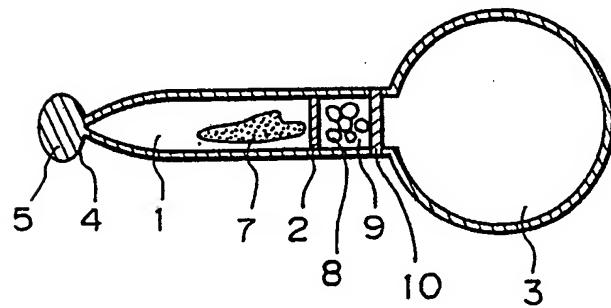
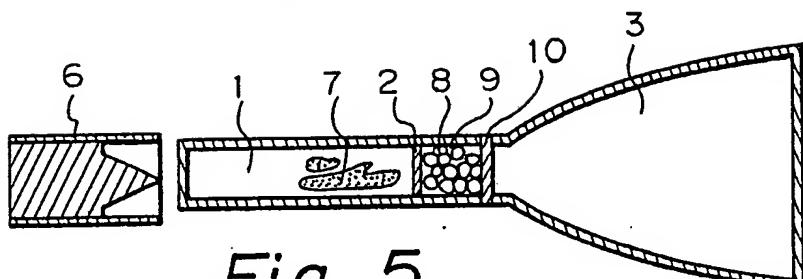
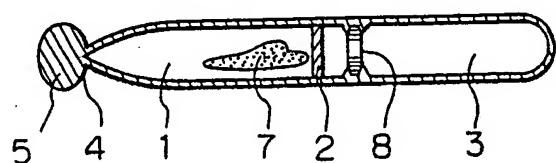
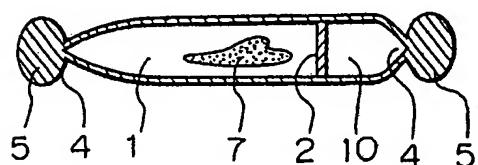
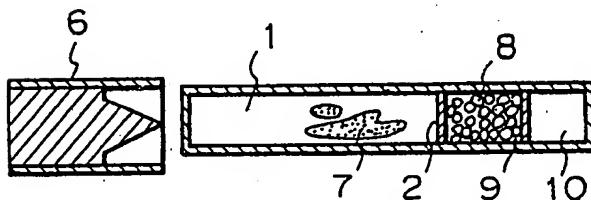
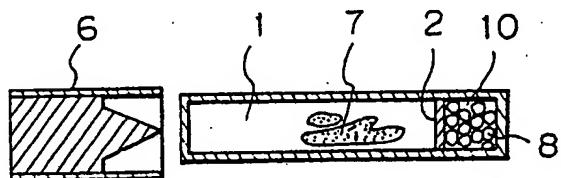


Fig. 3



2/₃*Fig. 4**Fig. 5**Fig. 6**Fig. 7**Fig. 8*

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Table of Reference Numerals

- 1: medicine-holding portion,
- 2: partition wall,
- 3: air reservoir,
- 4: small-diameter open end,
- 5: knob,
- 6: cap having projection,
- 7: powdery medicine,
- 8: desiccant,
- 9: desiccant-holding portion,
- 10: air-introducing portion

INTERNATIONAL SEARCH REPORT

International Application No PCT/JP 88/00811

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

⁴IPC : A 61 M 13/00

II. FIELDS SEARCHED

Minimum Documentation Searched *

| Classification System | Classification Symbols |
|-----------------------|------------------------|
| IPC ⁴ | A 61 M; A 61 J |

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched *

III. DOCUMENTS CONSIDERED TO BE RELEVANT*

| Category * | Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹² | Relevant to Claim No. ¹³ |
|------------|--|-------------------------------------|
| X | US, A, 2534636 (STIRN) 19 December 1950 see figures 2,3; column 2, lines 10-19; column 3, lines 33-40; claim 1 | 1,2,5,6,9 |
| Y | -- | 3,4,7,8 |
| Y | US, A, 1671011 (BRAECKLEIN) 22 May 1928 see figure 1; page 1, lines 66-69 | 3,7 |
| Y | -- | |
| Y | US, A, 2946332 (SACKS) 26 July 1960 see figure 2; column 3, lines 15-35 | 4,8 |
| X | CH, A, 532513 (CIBA-GEIGY AG) 28 February 1973 see figures 1-3; column 1, lines 29-34; column 2, lines 14-35 | 1,2,4 |
| X | -- | |
| X | DE, A, 837447 (RIED) 28 April 1952 see figure; page 2, lines 41-61 | 1,6,9 |
| | ----- | |

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IV. CERTIFICATION

Date of the Actual Completion of the International Search

26th October 1988

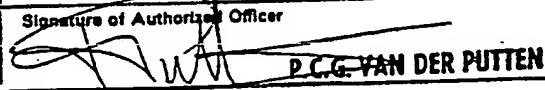
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ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. JP 8800811
SA 23828

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
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| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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| US-A- 2534636 | | None | |
| US-A- 1671011 | | None | |
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